REMARKS

In the Office Action, dated April 25, 2001, the Examiner states that Claims 1-31 are pending, Claims 21-31 are withdrawn from consideration, and Claims 1-20 are rejected. By the present Amendment, Applicants amend the specification, the claims, and the drawings.

In the Office Action, the Patent Office objects to Figure 4 because the selected distance L12 improperly denotes the space between branches 43b instead of second parts 46b. The Applicants have amended Figure 4 to correct this error.

In the Office Action, the Patent Office objects to Claims 1 and 9 because of the following informality: the phrase "the polarizing plate an the upper substrate". The Applicants have amended this phrase the read --the polarizing plate and the upper substrate--, as the Examiner suggested.

In the Office Action, the Patent Office rejects Claims 1, 9 and 14 under 35 U.S.C. §112, second paragraph. The Applicants have amended Claims 1 and 9 to recite -- a quarter wave plate is sandwiched between the reflecting plate and the lower substrate--, as suggested by the Examiner. Claim 14 has been amended, replacing "lengths" with --dimensions--, as suggested by the Examiner.

In the Office Action, the Patent Office makes several 35 U.S.C. §103(a) rejections to the claims. All of the references, with the exception of *Channin* (US 4,385,805), are dated subsequent to the priority date of June 30, 1998, claimed by this application, and therefore cannot be properly used to make these rejections. Additionally, the Applicants contend that *Channin*, based upon its disclosure, is also not a proper reference.

The *Channin* reference (col. 3, lines 23-28) discloses that the thickness of the liquid crystal layer is about 12 to 50 microns, and the spacing between the electrodes is about 25 microns. This disclosure does not teach that the distance that the distance between the upper and lower substrate is greater in length than the distance between the counter and pixel electrodes, as claimed in the present invention. Instead it merely discloses a workable range in which the

distance between the substrates may be greater or lesser in length than the distance between the electrodes. Furthermore, this reference does not teach that the purpose of making the distance between the substrates greater than the distance between the electrodes is so that a plurality of fringe fields may be formed in both sides of the electrodes sufficient enough to drive all liquid crystal molecules in the upper portions of the electrodes. The reference does not disclose that by doing this the transmittance of the reflective LCD is greatly improved.

Therefore, no reason or suggestion in the evidence of the record exists why one of ordinary skill in the art would have been led to produce the Applicants' claimed invention. *Channin* does not disclose that the distance that the distance between the upper and lower substrate is greater in length than the distance between the counter and pixel electrodes. Even if it did, all the elements of the claims are not taught and suggested, as required for prima facie obviousness under 35 U.S.C. §103(a), because the other references cited by the Examiner can not be properly used as prior art.

Since the Patent Office has failed to establish a prima facie case of obviousness in combining any art of record, the rejections to the claims under 35 U.S.C. §103(a) have been overcome and should be withdrawn. Notice to that effect is requested.

In light of the foregoing response, all the outstanding objections and rejections have been overcome. Applicants respectfully submit that this application should now be in better condition for allowance and respectfully requests favorable consideration.

Respectfully submitted,

July 24, 2001
Date

Attorney for Applicants
Richard J. Streit, Reg. No. 25765
c/o Ladas & Parry
224 South Michigan Avenue
Chicago, Illinois 60604
(312) 427-1300

O I P E JUL 26 2001 PATENT & TRADEMARK OFFICE

DOCKET CU-1962

RECEIVED JUL 30 2001 TECHNOLOGY CENTER 2

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT:	In Cheol PARK et al	)
		)
SERIAL NO:	09/345,270	) Group Art Unit: 2871
		)
FILED:	June 30, 1999	) Examiner: Q. VU

TITLE: REFLECTIVE LIQUID CRYSTAL DISPLAY OF HIGH APERTURE RATIO, HIGH TRANSMITTANCE AND WIDE VIEWING ANGLE

THE ASSISTANT COMMISSIONER FOR PATENTS
Washington, D.C. 20231

MARKED VERSION OF CLAIMS 1, 9 AND 14 AS AMENDED

1. A reflective liquid crystal display (LCD) of high aperture ratio, high transmittance and wide viewing angle comprising:

a lower substrate and an upper substrate opposed with a selected distance;

a liquid crystal layer sandwiched between the lower and the upper substrates and comprising a plurality of liquid crystal molecules;

a gate bus line and a data bus line formed on the lower substrate to define a pixel;

a counter electrode and a pixel electrode formed at an inner surface of the lower substrate wherein both electrodes are formed with a selected distance and width so that most of the liquid crystal molecules in upper portions of those electrodes are sufficiently driven by forming a fringe field between said counter and pixel electrodes;

a thin film transistor provided adjacent to an intersection of the gate bus line and the data bus line and transmitting a signal of the data bus line into the pixel electrode when the gate bus line is selected;

a polarizing plate disposed at an outer surface of the upper substrate;

a reflecting plate disposed at an outer surface of the lower substrate; and

a quarter wave plate sandwiched between the **[quarter wave]** **reflecting** plate and the lower substrate, or between the polarizing plate an**d** the upper substrate,

wherein both counter and pixel electrodes are made of a transparent conductor,

wherein a distance between the upper and lower substrates is greater in length than the distance between the counter and pixel electrodes.

9. A reflective liquid crystal display (LCD) of high aperture ratio, high transmittance and wide viewing angle comprising:

a lower substrate and an upper substrate opposed with a selected distance;

a liquid crystal layer sandwiched between the lower and the upper substrates and comprising a plurality of liquid crystal molecules;

a gate bus line and a data bus line formed on the lower substrate to define a pixel;

a counter electrode formed at each pixel of the lower substrate, transmitted with the common signal and having a plurality of branches diverged in parallel with the data bus line and at least a bar for connecting the branches, wherein the respective branches have a first width and they are spaced with a second distance;

a pixel electrode having a plurality of strips formed between the respective branches of the counter electrode, having a second width, and spaced apart by a third distance, and at least a bar for connecting the strips;

a thin film transistor provided adjacent to an intersection of the gate bus line and the data bus line and transmitting a signal of the data bus line into the pixel electrode when the gate bus line is selected;

a polarizing plate disposed at an outer surface of the upper substrate;

a reflecting plate disposed at an outer surface of the lower substrate; and

a quarter wave plate sandwiched between the **[quarter wave]** **reflecting** plate and the lower substrate, or between the polarizing plate an**d** the upper substrate,

wherein both counter and pixel electrodes are made of a transparent conductor,

wherein a distance between the upper and lower substrates is greater in length than the distance between the branch of the counter electrode and the strip of the pixel electrode,

wherein the first and second widths are set such that the liquid crystal molecules in upper portions of the branch of the counter electrode and the strip of the pixel electrode are aligned by the electric field between adjacent branches and strips.

14. The reflective LCD of Claim 13, wherein the **[lengths]** **dimensions** of the first width and the second width are in the range of 2 ~ 8μm respectively.

OIPE JC42 JUL 26 2001 PATENT & TRADEMARK OFFICE

RECEIVED JUL 30 2001 TECHNOLOGY CENTER 2800

DOCKET: CU-1962

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT:	In Cheol PARK et al	)
		)
SERIAL NO:	09/345,270	) Group Art Unit: 2871
		)
FILED:	June 30, 1999	) Examiner: Q. VU

TITLE: REFLECTIVE LIQUID CRYSTAL DISPLAY OF HIGH APERTURE RATIO, HIGH TRANSMITTANCE AND WIDE VIEWING ANGLE

THE ASSISTANT COMMISSIONER FOR PATENTS
Washington, D.C. 20231

MARKED VERSION OF AMENDED SPECIFICATION PARAGRAPHS

Page 5, second paragraph to Page 7, first partial paragraph

To accomplish the foregoing object, the present invention provides a reflective LCD comprising:

a lower substrate and an upper substrate opposed with a selected distance;

a liquid crystal layer sandwiched between the lower and the upper substrates and comprising a plurality of liquid crystal molecules;

a gate bus line and a data bus line formed on the lower substrate to define a pixel;

a counter electrode and a pixel electrode formed at an inner surface of the lower substrate wherein both electrodes are formed with a selected distance and width so that most of the liquid crystal molecules in upper portions of those electrodes are sufficiently driven by forming a fringe field between said counter and pixel electrodes;

a thin film transistor provided adjacent to an intersection of the gate bus line and the data bus line and transmitting a signal of the data bus line into the pixel electrode when the gate bus line is selected;

a polarizing plate disposed at an outer surface of the upper substrate;

a reflecting plate disposed at an outer surface of the lower substrate; and

a quarter wave plate sandwiched between the **[quarter wave]** **reflecting** plate and the lower substrate, or between the polarizing plate an**d** the upper substrate,

wherein both counter and pixel electrodes are made of a transparent conductor,

wherein a distance between the upper and lower substrates is greater in length than the distance between the counter and pixel electrodes.

The present invention further provides a reflective LCD comprising:

a lower substrate and an upper substrate opposed with a selected distance;

a liquid crystal layer sandwiched between the lower and the upper substrates and comprising a plurality of liquid crystal molecules;

a gate bus line and a data bus line formed on the lower substrate to define a pixel;

a counter electrode formed at each pixel of the lower substrate, transmitted with the common signal and having a plurality of branches diverged in parallel with the data bus line and at least a bar for connecting the branches, wherein the respective branches have a first width and they are spaced with a second distance;

a pixel electrode having a plurality of strips formed between the respective branches of the counter electrode, having a second width, and spaced apart by a third distance, and at least a bar for connecting the strips;

a thin film transistor provided adjacent to an intersection of the gate bus line and the data bus line and transmitting a signal of the data bus line into the pixel electrode when the gate bus line is selected;

a polarizing plate disposed at an outer surface of the upper substrate;

a reflecting plate disposed at an outer surface of the lower substrate; and

a quarter wave plate sandwiched between the **[quarter wave]** **reflecting** plate and the lower substrate, or between the polarizing plate an**d** the upper substrate,

wherein both counter and pixel electrodes are made of a transparent conductor,

wherein a distance between the upper and lower substrates is greater in length than the distance between the branch of the counter electrode and the strip of the pixel electrode,

wherein the first and second widths are set such that the liquid crystal molecules in upper portions of the branch of the counter electrode and the strip of the pixel electrode are aligned by the electric field between adjacent branches and strips.

Moreover, the present invention provides a reflective LCD comprising:

a lower substrate and an upper substrate opposed with a selected distance;

a liquid crystal layer sandwiched between the lower and the upper substrates and comprising a plurality of liquid crystal molecules;

a gate bus line and a data bus line formed on the lower substrate to define a pixel;

a counter electrode formed at each pixel of the lower substrate, transmitted with a common signal and shaped of a plate;

a pixel electrode formed over the counter electrode and having a plurality of strips, wherein the strip has a selected width and spaced from each other by a selected distance;

a thin film transistor provided adjacent to an intersection of the gate bus line and the data bus line and transmitting a signal of the data bus line into the pixel electrode when the gate bus line is selected;

a polarizing plate disposed at an outer surface of the upper substrate;

a reflecting plate disposed at an outer surface of the lower substrate; and

a quarter wave plate sandwiched between the **[quarter wave]** **reflecting** plate and the lower substrate, or between the polarizing plate an**d** the upper substrate,

wherein both counter and pixel electrodes are made of a transparent conductor,

wherein a distance between the upper and lower substrates is greater in length than the distance between the counter electrode and the pixel electrode,

wherein a width of the strip of the pixel electrode and a width of the counter electrode disposed between the strips are set such that the liquid crystal molecules in upper portions of the counter electrode disposed between the strips and the strip

of the pixel electrode are all aligned by the electric field between adjacent branches and strips.